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## NOTES ON A NEST OF BREMUS VOSNESENSKII (RADOSZKOWSKI)<sup>1</sup>

BY CHARLES H. HICKS  
*University of California at Los Angeles*

Professor H. A. Scullen<sup>2</sup> reports the range of *Bremus vosnesenskii* (Rad.) as extending from British Columbia to southern California and states that it is by far the most common species of bumblebee in the lower altitudes of western Oregon. Although it is a common bee in parts of its range, including Los Angeles, there appears to be no record of its nesting habits. During the summer of 1926 I had the good fortune to locate a nest at Griffith Park, Los Angeles, and to study somewhat its contents.

The nesting place was found June 15 near the foot of a high hill among a rather dense growth of plants. Earlier in the season the ground had been densely covered with grass, which at the time the nest was taken was about a foot long, dry and dead. The bees were flying rapidly in and out among the plants and were losing themselves in the grass.

In an attempt to locate the nest the weeds were cut and the grass pulled away. The change in the surroundings caused the bees some trouble, for on returning they flew to one side, where the general appearance of the plants was more nearly like the appearance of their previous nest site. It would seem that the position of the plants had been used by the bees to aid them in reaching the hidden entrance to their nest and that a removal of these landmarks had resulted in temporary confusion.

The bees were found to be entering a small hole in the ground and an attempt was made to reach the nest; first, by the aid of a jackknife; second, with a trowel, and third, with a shovel. This work was done on successive days and with much labor in the hot sun. During this time many bees were caught

<sup>1</sup> Kindly determined by Professor Theodore H. Frison.

<sup>2</sup> H. A. Scullen. Bees belonging to the family *Bremidæ* taken in western Oregon, with notes. *Pan-Pac. Ent.*, Vol. IV, p. 73. 1927.

on returning to or on leaving the nest; first, because I feared they might sting me, and, second, because the total number of the colony was desired.

It was while digging the nest that a very interesting fact was noted: namely, that the bees made no attempt to sting. This was the more remarkable since I was covered with perspiration and the nesting area was violently disturbed on many occasions. During all the time I worked near these bees not one displayed an aggressive spirit. Many nests of bumblebees have been taken in Ohio, Wisconsin and Colorado but *B. vosnesenskii* here proved least savage of them all.

On the first day 156 workers and 2 young queens were caught; the second day, 125 workers and 6 young queens; the third day, 51 queens were taken and 22 counted which flew away, 28 males taken and 25 counted which flew away; 33 workers taken and 10 flew away. Bees leaving the nest were only counted on the third day and just at or prior to the actual nest taking. This allows for no possible duplication of numbers as regards those leaving the nest. The total, then, which is accurate as far as it goes, but which does not include a few which may have been in the fields at the time the nest was reached, gives 324 workers, 81 young queens and 53 males, a grand total of 458 individuals composing the colony at this season.

When the nest was reached only young males and queens were found on the brood, with the exception of one worker which had recently emerged. The evidence here all pointed to the fact that almost without exception young males and queens were being produced and had been emerging for some time previously. Last on the brood and with no move to leave was the old queen, mother of the colony, with much of the hair worn from her head, thorax and abdomen and the remaining light hairs yellowish or brown, no longer white and pretty as in the young queens.

Males and sexually mature females were being produced here by *B. vosnesenskii* at a time when the weather was still hot and would continue to be so for a long time. But the dry season was already beginning to show its effect upon the vegetation and flowers were becoming increasingly fewer and fewer. It

is interesting that the production of males and females should be met with so early, a condition found in colder climates usually much nearer the fall of the year.

The nest of cells and cocoons was found in the ground at the end of a winding tunnel nearly six feet long and about three feet beneath the surface. The very entrance to the nest proper, where the brood was found, consisted of a tunnel with a diameter a little larger than a half dollar. Cups consisting largely of wax and containing honey were found on the upper part of the nest, then young larvæ with pollen about them, and cocoons below. The nest was twelve inches long by four or five inches wide at its greatest width, and from five to six inches deep. About the entire upper surface and about the sides of the brood, between it and the soil walls, was a thin, nearly continuous covering of wax. Below, on the floor, was some straw or dead grass blades and stalks. This was not very abundant and did not appear to have been material from the nest of a mouse.

Upon one mass of cocoons were four separate groups of eggs. Each group consisted of from six to ten eggs, each surrounded by pollen. The eggs were white, curved slightly and a few millimeters in length.

The cocoons could easily be divided into two types based on size, one quite a little larger than the other. The groups consisted, however, of cocoons of nearly uniform size and appeared to represent young from a given laying. The large cocoons later produced queens while the smaller produced males or drones. It would seem that at a given laying the female lays either male-producing eggs or queen-producing eggs and does not lay first one kind and then another in a given series.

Quite a little honey of a very sweet taste was found in the nest, stored in the cells. It seemed that much of this had been placed in old, remodeled cocoons of the bee. The bee on emerging chews a jagged hole at the top or upper side of the cocoon which is later trimmed nearly smooth and wax built up along the edges. Some of these cells, when filled, were completely sealed over with wax.

The nest was taken to my room and a record made of the bees emerging on the dates from June 20 to June 28 inclusive. They are in order as follows: One queen and 4 males; 5 males;

1 queen and 12 males; 1 queen and 1 male; 2 males; 2 queens and 4 males; 2 males; 2 queens and one male, and one queen and 2 males. Further records of this nature were not taken, but the cocoons were saved and later opened. It was found that no workers were contained in the cocoons, and as far as it could be ascertained from the material at hand, only males and queens were being produced at the time the nest was taken.

No insect parasites were found in this nest, although some beetles were found in the tunnel leading to the nest. A careful study of all the bees was made to see if a parasitic bee of the genus *Psithyrus* would be found in the nest, but no evidence was forthcoming. A comparison of the bees of the nest showed that there was little variation among the individuals in regard to the white markings on the head and abdomen. The greatest variation was among the workers with respect to size, the males and young queens respectively being quite uniform in this regard.

The workers were examined and it was found that some had been visiting at least two different kinds of plants in obtaining pollen on one collecting trip. This was very evident on some individuals by the two contrasting types of pollen on their legs. The change from one type to another was, however, always sudden and complete.

Further attempt has been made to locate nests of this bee, but without success. Professor Scullen writes me that although this species is found commonly in Oregon, he has not taken its nest. More study of the sex ratios and the causes resulting in the production of drones and queens should be made. Especially should a comparative study of these causes be made between species found in a climate like that of southern California and a climate with severe winters.

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#### A CORRECTION

Mr. W. Knaus of McPherson, Kansas, writes me that my *Cicindela arida* (Pan-Pac. Ent., V, 65, 1928) of which I had sent him specimens, is the same as his *Cicindela denverensis propinqua* (Jour. N. Y. Ent. Soc., XXX, 194, 1922). The type locality of *propinqua* is Ash Meadows, Nye County, Nevada, about twenty miles from the type locality of *arida*.—A. C. Davis.